Development Near the Refuge Boundaries

The KNWR is more impacted by urbanization than any other refuge in Alaska.

Development and urbanization near the refuge boundaries may pose potential contamination issues for the refuge. Several potential contamination sources exist due to increased urbanization including the following: air pollution from motorized vehicles and industry; stormwater drains and other discharges emptying into water sources including the Kenai River and its tributaries; chemical spills along roadways; power lines; and other point and non-point sources of pollution.

The KNWR is more impacted by urbanization than any other refuge in Alaska, due to its accessibility and its proximity to Anchorage, the most populated city in Alaska, with a population of 259,391 (July 1, 1999 estimate by Alaska Department of Labor and Workforce Development, http://www.labor.state.ak.us/news/news0013.htm). Additionally, Kenai, Soldotna and Nikiski are three growing cities within minutes of the refuge boundaries. According to the Alaska Department of Labor and Workforce Development as of July 1, 1999, Kenai's population was 7,005, Soldotna's was 4,140 and Nikiski's was 3,038 (http:/www.labor.state.ak.us /news/news0013.htm). It also should be noted that the City of Soldotna landfill is within ¼ mile of the refuge boundary.

Industrial Sources

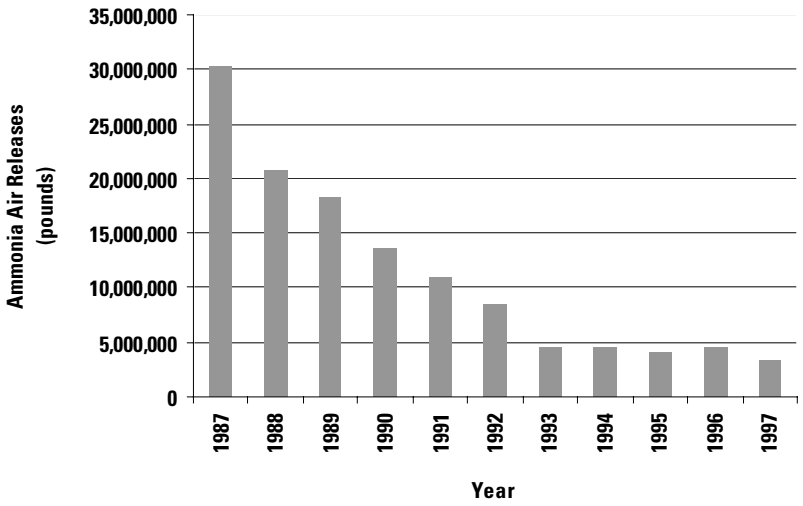
An industrialized area exists near the northwestern portion of the refuge boundary along the Spur Highway from Kenai to Nikiski. Major industrial sources include the Tesoro Refinery, in operation since 1969; Phillips Petroleum, a liquefied natural gas (LNG) processing facility that has been in operation since the late 1960s; and Agrium (formerly Unocal Agricultural Products Facility), which opened in 1969 and refines natural gas into urea and ammonia fertilizer.

Agrium facility. USFWS Photo by Tiffany A. S. Parson.

In 1997, the Unocal Agricultural Facility (now Agrium) released more air emissions than any other facility in Alaska, emitting 3,481,219 pounds of chemical (96% ammonia).

One concern noted by refuge personnel is the release of ammonia from the Agrium facility. The ammonia air releases from 1987 to 1997 are displayed in Figure 7. According to the 1997 Toxics Release Inventory (TRI), this facility released more air emissions than any other facility in Alaska, emitting 3,481,219 pounds of chemical (96% ammonia). Historically, plant upsets caused releases of ammonia above permitted levels (ENVIRO, Unocal Speaking of the Environment, January 1998). However, since 1986, Unocal has worked to continually reduce their ammonia emissions through system upgrades and installing flares. According to a Unocal publication entitled ENVIRO, Unocal Speaking of the Environment (June 1999), "flares have dropped ammonia releases due to plant upsets by 97 percent." Potential impacts of these historic and ongoing ammonia releases on refuge resources are unknown.

Figure 7. Ammonia Air Releases from Unocal Agricultural Facility (now Agrium) from 1987 to 1997.



Source: Toxics Release Inventory, 1997.

Air Quality

The refuge is designated as a Class II air quality area, and air quality has become an increasing concern over the years. Several sources may be contributing to diminished air quality such as vehicular and industrial emissions including sources in Anchorage and on the Kenai Peninsula. With continued development and urbanization, these sources will increasingly affect air quality. Air quality issues and concerns are discussed in several of the refuge narratives. Refuge personnel note that during clear cold weather a brown haze is often seen over Cook Inlet and the northern lowlands of the Refuge.

Stormwater Drains and Other Discharges

Numerous stormwater drains from the cities of Sterling, Soldotna and Kenai discharge directly or indirectly (though tributaries) into the Kenai River. A two year water quality study on the Kenai River conducted by Litchfield and Kyle (1992) found that river water samples taken from two storm drains at river mile (RM) 17.7 and

21.8 had a surface sheen and TPH concentrations of 1,300 and 2,600 mg/L, respectively (samples were taken after a rainfall). The storm drain at RM 17.7 drains several streets in the vicinity of Marydale Drive. The storm drain at RM 21.8 drains part of the Sterling Highway and several streets. This storm drain enters the river behind the State of Alaska Department of Transportation maintenance facility.

According to ADEC water quality standards 18 AAC 70.020 (May 27, 1999), "petroleum hydrocarbons, oil and grease may not cause a film, sheen or discoloration of the surface or floor of the waterbody or adjoining shorelines; surface waters must be virtually free from floating oils" for fresh water used for recreation.

Since the early 1990s, the cities in the Soldotna area have been proactive by providing various treatment systems for many of the storm drains, including the Marydale storm drain at RM 17.7. At this time, the storm drain at RM 21.8 does not have a treatment system (Dave Johnson, ADEC, pers. comm.). According to ADEC employee, Gregory Drzewiecki, currently there is no State water quality person for the Kenai Peninsula, and the storm drain discharges entering the Kenai River are not required to be monitored. Although these cities are primarily downstream from

The Kenai River is an invaluable resource for the Kenai National Wildlife Refuge. USFWS Photo by James E. Frates.

the refuge, contaminants entering the Kenai River from storm drains may impact trust species which inhabit/utilize the river.

A two-year study by Litchfield and Kyle (1992) also discovered that the lower more urbanized portion of the Kenai River in the Sterling/Soldotna/Kenai area had elevated concentrations of TPH and fecal coliform, when compared to the upper relatively undeveloped portion of the river. Additionally, benthic invertebrate populations were different between the upper and lower river, but there was no evidence that these differences were related to contaminants. The results of their study suggest that increased urbanization is impacting water quality in the more urbanized portions of the Kenai River.

Sterling Highway and Other Roadways

The transport of hazardous materials along the Sterling Highway and other roadways makes the refuge vulnerable to potential contamination events.

The Sterling Highway cuts through the heart of the KNWR and crosses approximately 21 miles of refuge lands. Vehicle emissions may pose air quality issues for the refuge. Stormwater runoff, snowmelt and road salts also may impact refuge resources. Additionally, the transport of hazardous materials along the Sterling Highway and other roadways makes the refuge vulnerable to potential contamination events. One example of a spill, which occurred along the Sterling Highway, was documented in the 1985 Annual Narrative. A 5,900 gallon unleaded gasoline spill was the result of a truck-trailer accident near Jean Lake (about Mile 61 of the Sterling Highway) on December 5, 1984. Some of the gasoline apparently reached Jean Creek, and absorbent booms and pads were used to trap the fluid. In June 1985, a site investigation was conducted and traces of fuel were detected at the site.

Power Lines

Due to urbanization on the Kenai Peninsula, power transmission lines have been installed on refuge lands. The refuge narratives document environmental disturbance and insufficient habitat rehabilitation/ restoration associated with power line installation in the late 1950s and throughout the 1960s. It appeared that habitat degradation issues rather than contaminant issues were the primary concern. Currently, no contaminant problems have been documented regarding power line easements on the refuge.

Other Sources

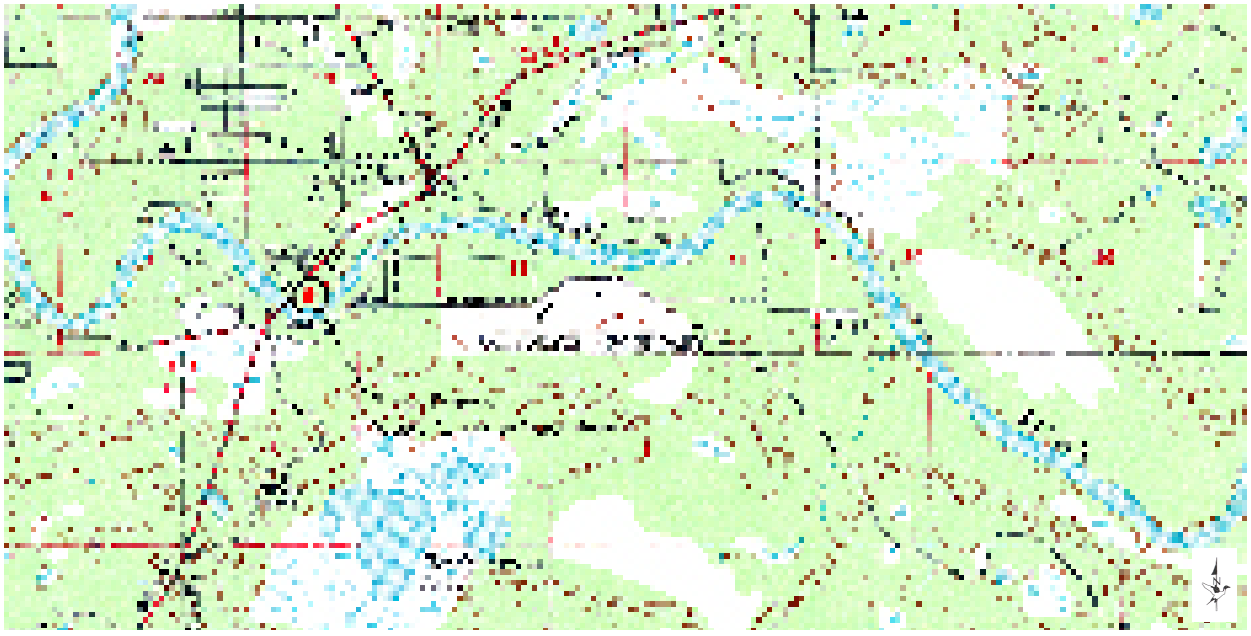
Due to increased urbanization, other point and non-point sources may have contaminant impacts on the refuge and its resources. One example is a contaminated site in Soldotna at the River Terrace Recreational Vehicle (RV) Park about half a mile downstream from the refuge boundary (star indicates approximate location, Figure 8). A citizen's complaint in 1992 about leaking barrels at the site was the impetus for a site investigation. Some of the analytes detected at the site are tetrachloroethene (PCE) and its degradation products including trichloroethene (TCE), dichloroethene (DCE) and vinyl chloride (VC), DRO and TPH. The contamination is thought to be from a former dry cleaning operation. In the late 1960s, a laundry facility and dry cleaning operation were located at this site. In the late 1980s, the dry cleaning operation closed; however, the laundry

facility currently remains open. The site was added to the ADEC database in June 1996; the ADEC spill number is 1992230918701.

The site cleanup started in 1997, and it has been a controversial and arduous process. Contamination at this site has impacted soil, groundwater and Kenai River surface water and sediments. While this site is downstream of the KNWR, the Kenai River is an invaluable resource to the refuge, and contaminants entering the Kenai River may impact trust species which inhabit/utilize the river.

In 1997, a comprehensive soil sampling process at the site revealed PCE concentrations at surface soil levels up to 4,700 ppm (ADEC, April 1997). PCE was detected down to 35 feet at 0.910 ppm (ADEC, April 1997). Sediment samples (May 1997 and May 1999) and surface water samples (May 1999) from the Kenai River indicated the presence of PCE and some of its breakdown products. In one surface water sample, PCE was detected at 2.5 ppb, approximately one-half the acceptable Safe Drinking Water Maximum Contaminant Level (MCL) of 5 ppb for PCE (18 AAC 70) in Kenai River surface water (Oasis/Bristol Environmental Services, 2000). Some sediment samples were above sediment quality benchmarks (SQBs) for PCE, TCE and Cis-1,2-dichloroethene (Cis-1,2-DCE) (Oasis/Bristol Environmental Services, 2000). Additionally, PCE is reaching the Kenai River through stormwater discharge. Apparently, contaminated groundwater is moving from the RV site beneath the Sterling Highway to the stormwater sewer system. At the outfall, PCE concentrations are approximately three to nearly five times greater than the MCL (Oasis/Bristol Environmental Services, 2000). Cleanup and monitoring activities are ongoing at areas impacted by this site. Pilot studies for the remediation of contaminated groundwater will begin in Summer 2000. For further information

Figure 8. Approximate Location of the River Terrace Recreational Vehicle Park.



U.S. Geological Survey. Kenai (B-3) Quadrangle, Alaska-Kenai Peninsula Borough, 1:63 360 Series (Topographic).

about this site, please contact Rich Sundet, ADEC Project Manager, at (907) 269-7578.

Summary: Development Near the Refuge Boundaries

Increased urbanization may contribute contaminants that potentially impact the refuge and its resources. Due to the location of the refuge and its accessibility, development likely will increasingly affect refuge lands and may impact fish and wildlife and their habitats.